

REMARKS/ARGUMENTS

This letter is responsive to the Office Action dated **February 3, 2003**. Under separate sheets of cover, applicant encloses a request for a three month extension of time and a Supplemental Information Disclosure Statement.

Restriction Requirement under 35 U.S.C. 121

In response to the restriction requirement under 35 U.S.C. 121, applicant confirms making a provisional election to prosecute the invention of Group II, namely Claims 4-12. Applicant has withdrawn the claims relating to Group I (Claims 1-3), and Group III (Claims 13-16).

Specification

The amendments to the specification introduce no new matter into the application, but merely correct typographical errors in the application as filed.

Drawings

In the Office Action, the Examiner approved the proposed drawing corrections and the proposed substitute sheets of drawings filed on 12/27/02. Applicant encloses the corrected formal drawings.

Voluntary Claim Amendments

Applicant has amended Claim 4 to replace the term "main fuel inlet" with the term "an inlet for a fuel" on page 13, line 26 and the term "fuel inlet" on page 14, lines 9 and 12. The terms "inlet for a fuel" and "fuel inlet" in Claim 4 relate to an individual fuel cell, and the term "main fuel inlet" in Claim 5 relates to the fuel cell stack.

Allowable Subject Matter

In the Office Action, the Examiner objected to Claims 7-8 and 11-12 as being dependent upon a rejected base claim, but indicated that they would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

To put objected to claim 7 into an allowable form, applicant has added new Claim 17 to incorporate the subject matter of original Claims 4, 5 and 7. New Claim 17 relates to the scenario where the outlet of the catalytic reactor can be selectively connected to one of the main fuel inlet and the oxidant inlet means and the supply of the oxidant and the fuel to the catalytic reactor is adjusted so that the heated and humidified gas at the

outlet of the catalytic reactor includes an excess of gas corresponding to one of the main fuel inlet and oxidant inlet means. New Claim 18 (which corresponds to original Claim 8), depends from new Claim 17. As indicated by the Examiner, new Claim 17 and dependent Claim 18 both contain allowable subject matter and are in condition for allowance.

Applicant notes that due to a typographical error in the application as filed, original Claim 11 was mistakenly made dependent on original Claim 10. Original Claim 11 should have been made dependent on original Claim 9. Accordingly, applicant has added new Claim 19 that incorporates the subject matter of Claims 4, 5, 9, and 11. Additionally, applicant has added new Claim 20 (that corresponds to original Claim 12) that depends from new Claim 19. As indicated by the Examiner, Claims 11 and 12 contain allowable subject matter since they relate to "the specific catalytic reactor structural arrangement and the second catalytic reactor" (which is independent of the subject matter in original Claim 10, namely, a fuel cell stack that includes a fuel outlet and means for recirculating fuel from the fuel outlet to the fuel inlet). Applicant submits that new Claim 19 and dependent Claim 20 both contain allowable subject matter and are in condition for allowance.

Obviousness Under 35 U.S.C. 103(a)

The Examiner rejects Claims 4-6 and 9-10 under 35 U.S.C. 103(a) as being unpatentable over Condit et al. (US Patent No. 6,416,891 B1)

The Examiner argued at page 5 of the Office Action:

"...In view of above, it would have been obvious to one skilled in the art at the time the invention was made to use the particular catalytic reactor as Condit et al. discloses that the fuel processing component mean includes a burner that may be preferably a catalytic burner that oxidizes any excess reducing fluid. Thus, those of ordinary skill in the art would understand that catalytic reactors can be employed because they facilitate oxidation reaction of fuel and generate water, and operate at suitably low temperature ranges. Accordingly, this fuel cell system may provide a thermodynamically optimized system for electrical power production due to the specific power generating elements configuration. Further, the cycle efficiency can be enhanced by adding all of the heat energy obtained from unreacted and reacted stream effluents to/from the fuel cell anode and/or supply source. Moreover, this arrangement thus provides the heat and humidity required for proper operation of the fuel cell." (Emphasis Added).

Condit et al. discloses a power plant 10 having at least one fuel cell 12 to which reformed gas is supplied from a reformer 126 and an oxidant is supplied from an oxidant supply 24. The fuel reforming components for producing the reformed gas include a burner 122 (e.g., a catalytic burner) and the reformer 126. An inlet of the burner 122 is connected to the anode exhaust line 20 for introducing the anode exhaust stream exiting from the fuel cell 12 into the burner 122. An outlet of the burner 122 is

connected to the reformer 126 via a reformer feed line 130 for delivering a combusted burner exhaust stream from the burner 122 to the reformer 126. Any unused hydrogen in the anode exhaust stream is oxidized to produce water in the burner 122 and thereby heat the anode exhaust stream leaving the burner 122 as the combusted burner exhaust stream and to render the burner exhaust stream leaving the burner 122 non-flammable (col. 13, lines 51-55). Accordingly, water is supplied to the reformer 126 as a vapor from the burner exhaust stream within the reformer feed line 130. By providing water to the reformer 126 in the described manner, a need for a conventional steam generating boiler is eliminated with attendant problems relating to freezing and heating (col. 14, lines 14-24). In essence, the burner 122 is employed to replace the steam generating boiler, which ultimately enhances the efficiency of the power plant 10. This water vapor is consumed in the reformation process, and is not intended to humidify the final fuel stream.

Condit et al. discloses two distinct methods of humidifying the fuel stream, neither of which involve the use of the burner 122. Specifically, Condit et al. discloses (a) an anode exhaust recycle line means 92 for selectively recycling a portion of the anode exhaust stream leaving the anode flow field 14 through the anode exhaust passage 20 back into the fuel inlet passage 18 (col. 11, lines 28-36); and (b) a fuel saturator 170 secured to the fuel inlet 18 (col. 16, lines 13-17).

Claim 4 requires a catalytic reactor having a first inlet for the fuel and a second inlet for the oxidant, and an outlet for remaining gas that has been heated and humidified, the catalytic reactor being connected to the fuel inlet, whereby, in use, with the fuel and the oxidant supplied to the catalytic reactor and the fuel being supplied in excess of the stoichiometric amount, the remaining, heated and humidified gas comprises heated and humidified fuel and is supplied from the catalytic reactor to the fuel inlet. Applicant submits that Condit et al. does not teach supplying a catalytic reactor with a stoichiometric excess of fuel such that the outlet delivers heated and humidified fuel. As discussed above, Condit et al. teaches using the burner 122 to deliver water in the form of vapor to the reformer means 126. Accordingly, Condit et al. teaches complete combustion of the fuel to render the burner exhaust stream exiting the burner 122 through the outlet non-flammable. Moreover, Condit et al. does not teach supplying the heated and humidified fuel to the fuel inlet of the fuel cell. Instead, Condit et al. teaches two distinct ways to humidify the fuel stream including an anode recycle line and a fuel saturator, neither of which involve the burner 122. There is no suggestion or motivation in Condit et al. to arrive at either of the two features noted above. Accordingly, applicant submits that Condit et al. does not render Claim 4 obvious.

Claims 5, 6, 9 and 10 depend from Claim 4. Accordingly, applicants submit that Claims 5, 6, 9 and 10 are allowable for at least the reasons given for Claim 4.

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For the reasons above, the Applicants submit that the claims are in condition for allowance. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Notification of Related Applications:

The Examiner is advised that applications 10/086,862 and 10/084,443 filed February 28 and March 4, 2002 respectively are divisionals of the present application.

Respectfully submitted,

Chen et al.



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MB/elb
Encl.

Attachments

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Amendments to the Drawings:

The attached drawings includes the corrected formal Figure, as already approved. These sheets, which includes Figures 1-5, replace the original sheets including Figures 1-5.

Attachment: 5 Replacement Sheets